

## Remarks

The following *Remarks* deal with the Examiner's objections and rejections in the order in which they are presented in the Office action of 7/28/05.

### 5    **The antecedent basis for the claims**

Applicants' attorney respectfully submits that Examiner will find antecedent basis for claims 3,97,9,24, 28,30, and 31 in the section of Applicants' Specification titled *Optimization of two-phase commit*, which begins at page 15. The subsection titled *Two-phase commit*, which begins at page 15, line 14 explains the two-phase commit protocol as it is generally known in the art.

10    The subsection titled *Optimizing two-phase commit when a transaction does not affect a database's state*, which begins at page 17, line 11, explains a known optimization of the two-phase commit protocol. The optimization described there is a variation of the optimization shown in FIG. 12 of Lampson and described beginning at col. 9, line 58 of the reference. The subsection of the Specification titled *Improving the optimization*, finally, which begins at page

15    17, line 26 sets forth the invention claimed by Applicants in the context provided by the general discussion of two-phase commit protocol. FIG. 4 shows the "augmented one of the messages [belonging to a transaction]" of claim 11 at 401, with the read only status flag 407 being the "protocol state information" ; the "retain[ed] state of the other component is shown at 415 in transaction object 411. An application of the method claimed in claim 11 to a two-phase

20    commit protocol is shown in the flowcharts of FIGs. 5 and 6, with an application of claim 11's step of "using the retained state to optimize the protocol" to the two-phase commit protocol being shown in the portion of the flowchart having the reference numbers 519 through 529. The flowcharts are described beginning at page 10, line 11. The application of the technique of claim 11 to a two-phase commit protocol is of course what is claimed in claims 3, 7, 9, 24, 28, 30, and

25    31, and consequently, all of these claims are fully supported by the Specification as filed.

### **The embedded hyperlinks**

Applicants have deleted `http://` from the embedded hyperlinks and have thereby rendered them inoperable.

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### **The rejection of claims 3,4,7-9,24,25, and 28-31 under 35 U.S.C. 112, second paragraph**

*The amendments to claims 3,4,7,24, and 28*

Claims 3, 4, 7, and 8 are dependent from claim 11 and claims 24, and 28 are dependent from claim 26. In both claim 11 and claim 26, the optimization techniques of the invention are not limited to two-phase commit protocols, but are claimed for any “protocol [which is] employed by the first component and the other component in making the transaction” . Language has been added to claims 3, 7, 24, and 28 to clarify the relationship between the protocol of the independent claim and the “two-phase commit protocol of the dependent claims, and Applicants believe that as a consequence of the added language, claims 3, 7, 24, and 28 now “particularly point out and distinctly claim” Applicants’ techniques as they are applied to two-phase commit protocols. As Examiner will immediately see from the discussion of the objection to the Specification as failing to provide the proper antecedent basis for the claimed subject matter, the claims as amended are fully supported by the Specification as filed.

*Traversal of the rejection of claims 9 and 30-31 under 35 U.S.C. 112, 2. paragraph*

Claims 9 and 30-31 are independent claims which set forth the inventive technique as applied to a two-phase commit protocol. The claims set forth the invention using the terminology employed generally to describe two-phase commit protocols and clearly set forth how the techniques of the claims may be used in systems that employ the two-phase commit protocol. For example, claim 9 is a method claim which sets forth the technique as seen from the point of view of the coordinator in a two-phase commit protocol. It clearly sets forth the augmented message, which does not belong to the two-phase commit protocol, and the use of the retained state information from the augmented messages to modify the manner in which the coordinator executes the protocol:

if the state information for the cohort indicates that the transaction does not modify the cohort’s data, sending an abort message of the two-phase commit protocol to the cohort.

Because the claim clearly sets forth the distinctions between two-phase commit protocols that employ Applicants’ techniques and those that do not and between two-phase commit protocols that employ Applicants’ techniques and the modified two-phase commit protocols of Lampson, the claim satisfies the requirements of 35 U.S.C. 112, 2. paragraph, and as Examiner will immediately see, the same is the case with claims 30 and 31.

**Traversal of the rejection of claims 2, 5, 6, 10-23, 26 and 27 under 35 U.S.C. 102(b) as anticipated by Lampson**

*Lampson's disclosure*

The independent claims here are claims 5, 10, 11, 22, and 26. In his rejection of these claims, Examiner refers Applicants to FIG. 12 of Lampson and the explanation of the figure at col. 9, line 58-col. 10, line 6. What is disclosed in Lampson is the optimization of the two-stage commit protocol set forth at page 17, lines 19-24, namely that if a cohort is read only with respect to a transaction, it responds to a commit request from the coordinator with a "read" message that is not part of the standard two-phase commit protocol, and when the coordinator receives a "read" message from a cohort, it ignores the cohort for the rest of the two-phase commit protocol, i.e., it sends neither an "abort" message nor a "commit" message to the protocol.

*Applicants' optimization technique*

An important difference between this optimization technique and Applicants' optimization technique of claims 5, 10, 11, 22, and 26 is the following: The transaction with which the protocol is being used consists of messages that are exchanged between the entities that are carrying out the transaction. These messages of course go via the coordinator and cohorts but are distinct from the messages which the coordinator and the cohort exchange as part of the protocol. In Applicants' technique, whenever a cohort transfers one of these transaction messages to a coordinator, the cohort augments the transaction message (termed a "cohort message" (403) in FIGs. 4-6) with status information 405 that indicates at read-only status 407 whether the cohort is still read only for the transaction.

The coordinator uses the information in read-only status 407 as follows. The coordinator has a link-transaction object 411 for the transaction and the link to the cohort, and that object includes current status information 413 with respect to the link's transaction for the cohort. Status information 413 indicates at read-only status 415 whether the cohort is still read-only with respect to the transaction represented by the link-transaction object. As shown in flowchart 501, each time the coordinator receives an augmented transaction message (cohort message) from the cohort, it sets read only status 415 to the value indicated by read-only status 407 in the augmented transaction message. When the transaction terminates, the coordinator can tell whether the cohort is read only with regard to the transaction by looking at read-only status 415 in the cohort's link transaction object. If read only status 415 indicates that the cohort is read-

only, the coordinator sends the cohort an “abort” message of the protocol instead of a “commit” message. All of the above is explained in detail beginning at page 17, line 26 of Applicants’ Specification.

- 5 Thus, in Applicants’ technique, the coordinator does not send the read-only cohort a commit request when the transaction terminates and then wait for a read-only message from the cohort to decide what message to send the cohort in the second phase of the commit protocol. Instead, the coordinator simply reads the value of read only status 415 when the transaction terminates, and if the value indicates that the cohort is read only with respect to the transaction, the
- 10 coordinator immediately sends the cohort an abort message. Thus, at the cost of a small amount of additional bandwidth for the transaction messages that go from the cohort to the coordinator, the coordinator sends only an “abort” message of the protocol to the read-only cohort on transaction termination and no longer needs wait for the read only cohort to respond to the “commit” message. A further advantages of the technique is that use of the technique does
- 15 not require any changes in the messages of the standard two-phase commit protocol or in the ways the coordinator and the cohort respond to them. See in this regard page 19, lines13-16.

*The invention in Applicants’ claims*

- An element of Applicants’ optimization technique which immediately distinguishes it from
- 20 Lampson’s optimization technique is the use of the augmented transaction message to carry information about the state of the cohort to the coordinator. That element of the technique appears as the following limitation in claim 11:

- 25 receiving an augmented one of the messages from the other component, the other component having augmented the message by adding protocol state information to the message, the protocol state information indicating a state of the other component that is relevant to the protocol

- It should be noted here that the “messages” are defined in the preamble of claim 11 as “messages belonging to a transaction”, that is, they are *not* messages of the protocol being
- 30 optimized. The protocol appears in the preamble as “the protocol being employed by the first component and the other component in making the transaction”.

Moreover, since there are no “augmented messages” in Lampson, there is also nothing equivalent to claim 11’s limitation of

retaining the state of the other component indicated in the augmented message;  
or to the claim's limitation of  
using the retained state to optimize the protocol.

Because Lampson discloses none of the limitations of the body of claim 11, the reference does  
5 not anticipate the claim and Examiner's rejection is without basis. As Examiner will  
immediately see, similar arguments will apply with regard to claims 5, 10, 22, and 26, as well as  
with regard to independent claims 9, 30, and 31, and consequently rejection of these claims on  
the basis of Lampson is also without basis. The claims dependent from claims 5, 9, 10, 11, 22,  
26, 30, and 31 are of course all patentable over Lampson because they are dependent from  
10 patentable claims. Dependent claims 3, 7, 24, and 28 are further patentable in their own rights  
over Lampson because the added limitations of these claims set forth details of Applicants'  
optimization techniques which have no equivalent in Lampson.

*Rebuttal of Examiner's arguments*

15 In his rejection of claims 5, 10, 11, and 22, Examiner finds the step of receiving an augmented  
one of the messages in the receipt of a read vote from the cohort by Lampson's coordinator. The  
problem with this reading is that the "read vote" is a message *of the protocol*, not the augmented  
message [belonging to a transaction]" of Applicants' claim. As for "retaining the state of the  
other component indicated in the augmented message", Examiner reasons that because  
20 Lampson's coordinator counts yes votes and no votes from the cohorts, it must retain the read  
votes. The problem here is that the "read vote" is not an "augmented message" and thus  
retaining the "read vote" is not "retaining the state of the other component indicated in the  
augmented message", as required by the limitation.

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**Conclusion**

Applicants have traversed the objection to the Specification as failing to provide the proper  
antecedent basis for Applicants' claims, have amended the Specification to render the URLs  
therein inoperative, have amended claims 3, 7, 24, and 28 to overcome the rejections of those  
30 claims under 35 U.S.C. 112, second paragraph and have traversed the remaining rejections  
under 35 U.S.C. 112. Applicants have further traversed the rejections under 35 U.S.C. 102 and  
have shown why claims 3, 4, 7-9, 24, 25, and 28-31 are not anticipated by Lampson. Applicants  
have consequently been fully responsive to Examiner's non-final Office action of 7/28/2005 as



required by 37 C.F.R. 1.111(b) and respectfully request that Examiner continue with his examination and allow the claims as amended, as provided by 37 C.F.R. 1.111(a).

No fees are believed to be required for this response. Should any be, please charge them to Deposit Account Number 501315.

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Respectfully submitted,

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